# CONFIGURABLE DRIVESHAFT ASSEMBLY

## BACKGROUND OF THE INVENTION

[1] The present invention relates generally to a vehicle drivetrain assembly and, more particularly, to a configurable driveshaft assembly.

[2] Generally, the driveshaft operates within the drivetrain system to transmit torque from the engine to the axles and wheels. Engine torque is transmitted through a transmission to a forward driveshaft. The forward driveshaft transmits the torque through a forward axle and to the forward vehicle wheels. An interaxle driveshaft connects from the forward axle to the rear axle and transmits torque to the rear axle and to the rear vehicle wheels.

[3] A driveshaft is typically assembled of two halves, a male half and a female half. When connected, the two halves form a driveshaft length for assembly into a particular vehicle configuration. Each vehicle typically requires a unique driveshaft assembly.

[4] Conventional driveshafts utilize a tube on the male half in order to lengthen the driveshaft assembly. In this configuration the male half consists of a number of attached segments, one of the segments being the tube. By using a longer or shorter tube, the length of the assembly is made longer or shorter, respectively. Still, this type of tube assembly configuration may not adequately address the multiplicity of driveshaft configurations, particularly shorter lengths, as a minimal length is limited by the length of the female half. Therefore, numerous unique components are often required for each vehicle configuration.

[5] Accordingly, it is desirable to provide for commonality of driveshaft components as well as improved capability in adapting a common driveshaft assembly to a particular vehicle driveshaft length.

## SUMMARY OF THE INVENTION

[6] The driveshaft assembly of the present invention includes a common male component and a female component in engagement with the male component. The female component includes a yoke, a configurable segment, a positive stop member, a receptacle member, and a seal. The configurable segment has a predetermined length that corresponds to a particular

vehicle driveshaft length. The present invention therefore provides for common driveshaft components among vehicles having different driveshaft assembly lengths by utilizing a different length configurable segment in each assembly.

[7] The driveshaft assembly according to the present invention provides for commonality of driveshaft components as well as improved capability in adapting a common driveshaft assembly to a particular vehicle driveshaft length.

## BRIEF DESCRIPTION OF THE DRAWINGS

[8] The various features and advantages of this invention will become apparent to those skilled in the art from the following detailed description of the currently preferred embodiment. The drawings that accompany the detailed description can be briefly described as follows:

[9] Figure 1 is a schematic view of a drivetrain system;

[10] Figure 2 is a cross-sectional view of a driveshaft assembly according to the present invention;

[11] Figure 3 is a detailed view of a male component as illustrated in Figure 2;

[12] Figure 4 is an exploded view of a female component as illustrated in Figure 2; and

[13] Figure 5 is a cross-sectional view of another driveshaft assembly according to the invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[14] Figure 1 refers to a vehicle drivetrain system 10 of a tandem axle configuration. Within the drivetrain system 10 there is an engine 12 that transmits power through a transmission 14 to a forward driveshaft assembly 16. The forward driveshaft assembly 16 transmits the engine power to a forward drive axle 18 which in turn drives the front tires 20. An interaxle driveshaft assembly 24 is coupled to the forward drive axle 18 and transmits engine power to a rear axle 26. The rear axle 26 in turn drives the rear tires 28.

[15] Figure 2 illustrates a driveshaft assembly including a male component 32 and a female component 34. It should be understood that the term driveshaft as used herein

includes the forward driveshaft, interaxle driveshaft, and other drivetrain components that likewise benefit from the invention. The female component 34 is in sliding engagement with the male component 32 along an axis 30. A grease fitting 38 and welch plug 40 are disposed in the female component 34. A seal 42 between the male component 32 and female component 34 prevents intrusion of foreign particles into the driveshaft assembly 24 and maintains lubrication for the sliding engagement between the male component 32 and female component 34.

[16] Referring to Figure 3, the male component 30 includes a male yoke 50 which tapers into a stem portion 54. One segment of the stem portion 54 is a splined segment 56A which allows a sliding engagement with corresponding internal splines 56B (Figure 4) within the female component 34.

[17] Referring to Figure 4, the female component 34 includes a female yoke 60 and a configurable segment 36. The configurable segment 36 is preferably tubular, however, other configurations will likewise benefit from the present invention. The configurable segment 36 comprises a rolled tube. The surrounding female components are preferably machined components. Alternatively, the configurable segment 36 may also comprise a machined component.

[18] The configurable segment 36 has a beveled end portion 66 which engages female yoke beveled edge 68 and a second beveled edge 67 which engages a receptacle member 62.

[19] Receptacle member 62 includes a welch plug 40 and a cylindrical member 72 which contains the internal splines 56B. The internal splines 56B provide sliding engagement with splined portion 56A (Figure 3) of the male component 30. The female component 24 provides a grease aperture 68 to receive the grease fitting 38. A seal 77 prevents debris and the like from entering into the female component 34 as the male component 30 slides relative thereto.

[20] Referring to Figure 5, the driveshaft assembly 80 has a length $L_4$ that is longer than the driveshaft assembly 24 length $L_1$ (Figure 2). Driveshaft assembly 80 includes a configurable segment 78 having a length $L_3$. Except for the configurable segment, the driveshaft assembly 80 utilizes the same components as the driveshaft assembly 24. The

overall desired driveshaft length is therefore readily configurable with a minimum number of components.

[21] The foregoing description is exemplary rather than definitive in nature. Many modifications and variations of the present invention are possible in light of the above teachings. The preferred embodiments of this invention have been disclosed, however, one of ordinary skill in the art would recognize that certain modifications would come within the scope of this invention. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described. For that reason the following claims should be studied to determine the true scope and content of this invention.